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BY

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MAX EINHORN, M. D.,

Physician to the German Dispensary and Instructor in
Clinical Medicine at the New York Post-
Graduate Medical School.

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AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL.

IN November, 1889, I published a short article under this title in the *Neu-Yorker medicinische Monatsschrift*. As this paper has not been printed in English, I think it best to give first a translation of the same, in order to thoroughly acquaint the reader with the subject, and then to add several new points. My first article on gastrodiaphany reads as follows:

“The desire to utilize sight—that sense which enables us to judge in the quickest and surest way—in the diagnosis of diseases of the stomach existed long ago, and led to the invention of Mikulicz’s gastroscope. If, however, a method of examination is to be applied in practice, it must not be troublesome either for the physician or for the patient. Thus far the gastroscope has not come into practical use, because it consists of a metal tube, which is troublesome and painful to insert. However, for looking into the stomach an inflexible tube is necessary, in order that the canal shall not change. As it is not easy to

* Read in part before the Society of German Physicians, September 23, 1892.

look into the stomach, I had the idea, about two years ago, of photographing its interior. This should be possible by the introduction of an Edison lamp, as well as a very minute camera obscura, into the stomach on a soft-rubber tube. By suddenly closing the current, an instantaneous photograph should appear. Technical difficulties thus far have prevented me from realizing this plan. At the same time, about a year ago, Voltolini's article appeared on the translumination of the larynx. Voltolini has put the source of light outside of the neck, and has been enabled by means of this translumination to see clearly the interior of the larynx in the laryngeal mirror. This at once led me to the belief that it must be possible, by having the source of light within the stomach, to see the latter through the abdominal wall, or to make it translucent. With a light inside, the stomach forms a kind of a lantern, which ought to be recognizable through the translucent tissues. As small streaks of light are more perceptible in a dark room, I concluded likewise that it would be best to illuminate the stomach in a dark room.

"This idea has been put into execution by me and proved to be quite correct.

"For examination I make use of a very simple apparatus, which I have had made by the firm of J. Reynders & Co., of this city. The apparatus consists of a soft-rubber tube, at the end of which is fastened an Edison lamp (of hard glass) by means of a small metal mounting; from here conducting wires run to the battery; at some distance from the rubber tube there is a current-interrupter. The insertion of this apparatus into the stomach is no more difficult than that of the ordinary tube alone. I usually have the patient, in a fasting condition, drink one to two glasses of water, and thereupon insert the apparatus, lubricated with glycerin.

"This method of examining the stomach I should like to designate 'gastrodiaphany,' for the stomach becomes translucent, and the apparatus serving this purpose the 'gastrodiaphane.'

"Our object is mainly to show the size and the situation of the stomach to the eye, and, secondly, to recognize tumors or other gross anatomical changes of the anterior wall of the stomach.

"After having frequently performed 'gastrodiaphany' in man, I noticed in perusing the literature that the idea of transluminating the stomach as just described had already been expressed in 1867 by Milliot and tried on animals. Mil-

liot used for this purpose a narrow glass tube, in which there were two thin platinum wires connected with the electrodes of a Middeldorpf apparatus, so that in this way a bright light could be produced.

"In man, however, gastrodiaphany had not as yet been tried, and I am therefore the first who has made use of it. The apparatus serving for translumination of the stomach could likewise be applied to the examination of the colon. Here also the organ will have to be filled previously with water or with air.

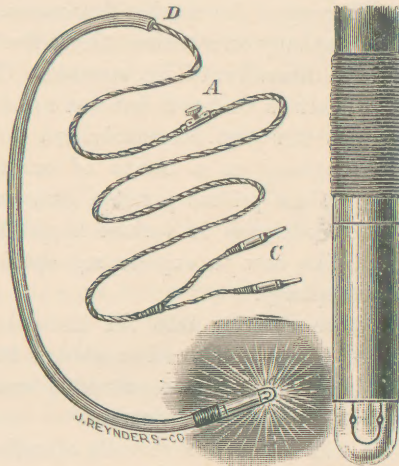


FIG. 1.—The gastrodiaphane.

"My investigations on gastrodiaphany are still in their infancy, and I would ask you at present to desist from a discussion on this subject until I have made a second communication.

"Suffice it to-day to show you that we are able to transilluminate the stomach in man, and to make it apparent to the eye in an easy way."

[Thereupon the speaker demonstrated to the assembly gastrodiaphany on a patient, thirty-five years of age, suffering from dilatation of the stomach. The lower margin of the stomach in the navel line was to be seen.]

Since this first communication I have made use of gastrodiaphany as a means of examining the stomach mainly in my private practice, occasionally also at the request of colleagues in various hospitals of this city, and I should like now to express my opinion on the value of gastrodiaphany.

Before entering into the discussion of the proposed subject, I may be allowed to address Mr. Trouvé, who criticised in a few words the gastrodiaphane in a letter sent to the *New York Medical Journal*.*

In this letter Trouvé calls attention to his polyscopes constructed in 1869, and especially to his gastroscope, by means of which "Professor Collin, of Alfort, since 1876, has been demonstrating to his pupils the interior of the ox's stomach in order to teach them the digestion of that ruminant."

Thereafter Trouvé adds: "My electric gastroscope also leaves Dr. Max Einhorn's gastrodiaphane just twenty years behind it."

In answer to these remarks I would say that the transillumination of the stomach and the looking into the same are two totally different things. Gastroscopy has been

* *New York Medical Journal*, May 28, 1892, p. 580.

practiced even on man, especially by Mikulicz, and the Leiter-Mikulicz gastroscope has been known to the whole world for many years. Whether Trouvé constructed his polyscope previous to Mikulicz or not I do not know. This, however, does not touch the question of translumination of the stomach. In reference to this point Trouvé says: "There is evidently no further occasion to speak here of diaphanoscopy. As a diagnostic procedure it was long ago condemned. . . . Dr. Milliot made experiments in Paris in diaphanoscopy upon the stomach of animals. In 1868 Dr. Lazarevic, of Karkoff, published a brochure upon the subject. *No undertaking in this direction has succeeded, and none could succeed.*"

This is the reason why Trouvé has not tried translumination, but endeavored to look into the stomach by means of the polyscope (or gastroscope).

As stated above, the gastroscope could not come into practical use on account of its being of stiff metal and offering in this way many difficulties. The gastroduaphane, on the contrary, is thoroughly flexible, and just as easy to handle as the ordinary stomach-tube. For this reason it will, I hope, be used by the profession in general.

In order to avoid misconstructions, I have preferred to use the term "gastroduaphany" instead of "gastroduaphanoscopy," as it was previously termed. I intended thereby to express that translumination was not able to replace the looking into or taking into view the interior of the stomach; it is only possible by this method to make the stomach translucent, and thus to examine its condition of translucency. The word "gastroduaphany" (translucency of the stomach) should in this way immediately indicate that the method enables one to judge about the contours, size, and position of the stomach; further also to determine whether the anterior wall of the stomach is not greatly thickened or

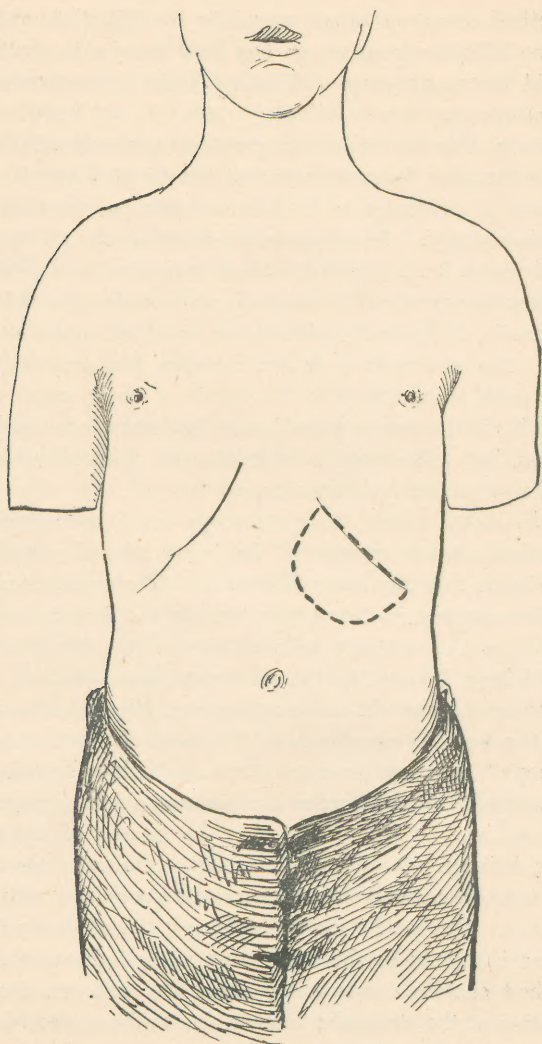


FIG. 2.—Transilluminated zone of a normal stomach. (Schematic.)

occupied by a tumor, as under these circumstances the quality of translucency of the stomach would be decreased or entirely extinguished.

The method of gastrodiaphany has been described above. I would add that I use Ford's storage battery, being the most suitable for the purpose, and that I exam-

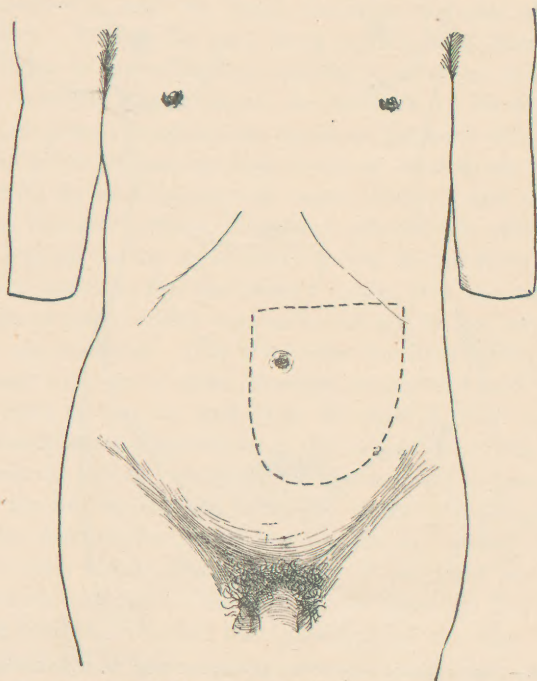


FIG. 3.—Transilluminated zone of a dilated stomach. From patient H. B.
(Schematic.)

ine the patient either in a standing or a recumbent posture. The stomach presents itself as an illuminated zone of a reddish hue on the abdominal walls; its contours can be discerned more accurately by pressing with the hand on

the abdomen in the neighborhood of the translumination figure, or, speaking more correctly, by counter-pressing the stomach. By means of this manipulation the point in question is brought nearer to the source of light, in case

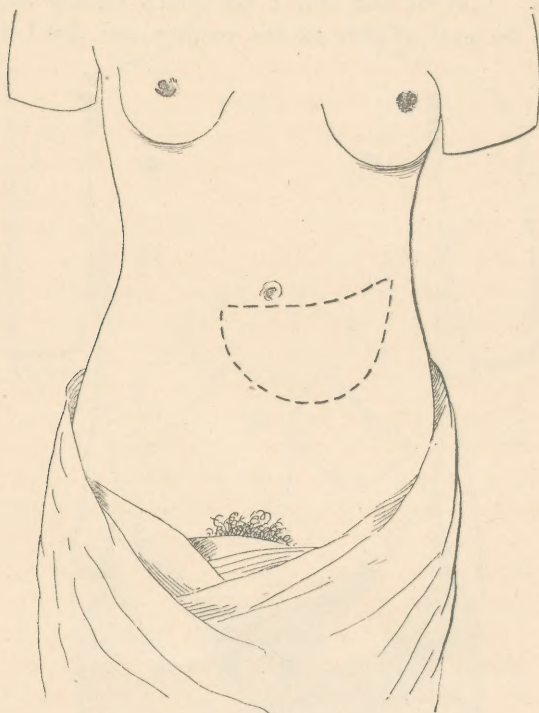


FIG. 4.—Transilluminated zone of the stomach of Miss M. Z., suffering from gastropotosis. (Schematic.)

the stomach is situated beneath it. Normally the translumination zone of the stomach is found in every individual.

It is of interest to observe that the stomach moves farther down during a forced inspiration—*i. e.*, the translumination zone is seen to descend. During a strong con-

traction of the stomach the translumination figure becomes considerably smaller. This can be frequently observed as soon as the patient tries to vomit during the examination.

Three years ago I was able to demonstrate in the German Medical Society of New York that we could quickly perceive by means of "gastrodiaphany" a dilatation of the stomach—*i. e.*, that we could determine the size of the stomach. During the past three years I have frequently made use of gastrodiaphany, mainly in order to recognize with certainty dilatations of the stomach. I have, however, frequently compared the results of diaphany with those of the other ordinary methods (such as inflating the stomach with air or filling it with water [Dehio]), and usually found the same limits. Diaphany affords the advantage that it gives us the opportunity to see the stomach in its *natural* position, for the patient drinks only one or two glasses of water, which amount could not in any way distend the stomach. The two other methods (filling the stomach with gas or fluid), however, necessitate such large quantities of gas or fluid that the method itself might eventually effect a distention of the organ, and in this way conceal the natural condition. If the stomach is considerably dilated, one can see by means of the gastrodiaphane on the abdominal walls of the patient an intensely lucid lower zone, which is situated between the navel and the symphysis and goes over into a less intensely clear zone which sometimes borders the left margin of the ribs. The translumination figure corresponds with both that part of the stomach which is filled with water and that which is filled with air.

As an illustration of the numerous cases of dilatation of the stomach examined by means of the gastrodiaphane, I give one drawing which shows the exact figure obtained by translumination.

In contradistinction to dilatation of the stomach, the cases of gastropptosis (low position of the stomach) show a

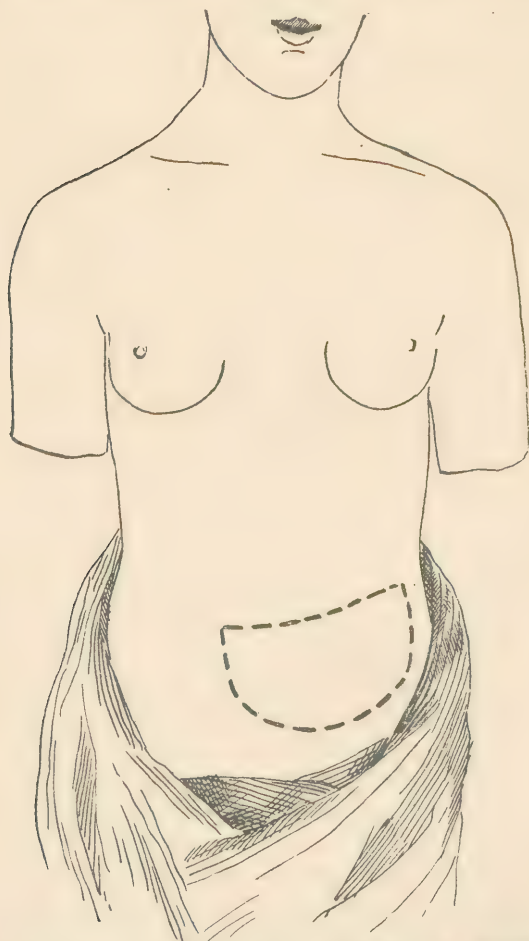


FIG. 5.—Transilluminated zone of the stomach of Mrs. P. F., suffering from gastropptosis. (Schematic.)

relatively small translumination zone, which is situated far below and extends from about the symphysis to the navel.

The preceding drawings, representing two patients with gastropotosis transilluminated, will sufficiently illustrate the foregoing remarks.

As is well known, Ewald * has drawn attention to the necessity of determining the site of the small curvature before diagnosing "gastropotosis." Ewald made use of the inflation method for this purpose. It is, however, quite apparent that in this respect gastrodiaphany will render more exact and striking results.

Recently I had an opportunity of examining a patient with carcinoma ventriculi in whom the translumination of the stomach was not apparent—*i. e.*, the field of translucency of the stomach was absent. In connection with other methods of diagnosis, one is enabled to state that the anterior wall of the stomach in this case is the seat of a thickening, which is most likely due to cancer. Permit me to describe this case more minutely :

William R., forty-eight years of age, bartender, has suffered from digestive troubles since the summer of 1891. At that time the patient could eat everything; vegetables, however, tomatoes and potatoes, gave him trouble—*i. e.*, he had then after meals an oppressive feeling for two whole hours; thereafter he used to feel free from pain. His appetite was poor. In June of this year he felt worse and weaker. Meat would not agree with him; as soon as he partook of it he would repent for some time, until at the end of about two hours he used to vomit. He can now partake of soup and bread, which agree well with him, and do not cause any trouble in his stomach. He has lost greatly in weight, which was formerly a hundred and sixty-four pounds, and is now only a hundred and twenty-five. He had never had distinct pains, with the exception of the oppressive feeling mentioned.

* Ewald. *Berlin. klin. Wochenschr.*, 1890, No. 12.

September 20, 1892.—*Status Præsens*.—A strongly built man with sallow complexion. Panniculus adiposus very sparse. Heart and lungs are intact. By palpation one can feel a resistance under the left margin of the ribs as soon as the abdominal walls are relaxed; this resistance shows an even surface, begins about two to three fingerbreadths beneath the ensiform process, is about 8 ctm. long, and moves a little during inspiration. On pressing, there is very little tenderness. There is no swelling of the glands. The liver and spleen are not enlarged. The urine is free from sugar and albumin. The patient is told to swallow some water: Meltzer's *Spritzgeräusch* (first swallowing sound) is heard immediately; there is no *Pressgeräusch* (second swallowing sound, which is heard usually about eight seconds after deglutition).

22d.—One hour after Ewald's test breakfast: $\text{HCl} = 0$; lactic acid present; rennet ferment = + little; acidity = 30. There can be found some remnants of food from the day previous.

23d.—When fasting: Tube No. 11 (about 1 ctm. in diameter) passes the cardia without any resistance; about 40 c. c. of decomposed stomach contents appear through the tube. The stomach is then washed until the water flows perfectly clear. Thereupon the patient drinks a glassful of water and is examined by means of the gastrodiaephane in a dark room: no lucid spots can be seen in the stomach region—*i. e.*, there is *no trace of translumination present*. When taking out the gastrodiaephane from the stomach, which this time has been done without interrupting the current, one sees the lamp perfectly illuminated.

29th.—Patient is examined when fasting. The stomach contains about 30 c. c. of bad-smelling contents. The stomach is subjected to a thorough lavage. Thereupon the patient drinks a glass of water and is examined by means of the gastrodiaephane. The result of the examination is entirely negative—*i. e.*, there appears *no translumination*. [This time there were present several colleagues, to whom I successfully demonstrated (with the same apparatus) gastrodiaephany on two other patients.]

The negative result of gastrodiaephany in this case seems to indicate with certainty that the whole front wall of the

stomach is thickened to such a degree that it can no longer transmit light.

As the cardia and the pylorus here are not strictured (thick sounds pass into the stomach without any resistance; on the other hand, there is no vomiting as long as the patient partakes of easily digestible substances), the result obtained by the diaphany examination appears to be still more valuable. In summing up the result of the chemical examination of the stomach with the other symptoms mentioned, it is evident that we have to deal in this case with a carcinoma which has caused a diminution in the size of the stomach and which has led to a thickening of its front wall. Although in this case the diagnosis of cancer of the stomach could be made even by the other methods of examination, the same becomes, however, more certain and the anatomical condition more clearly pointed out *by the negative result of gastrodiaphany*.

The value of gastrodiaphany would in this way consist of the following :

1. We are enabled to recognize quickly a dilatation of the stomach.
2. The condition called "gastroptosis" can with certainty be pointed out.
3. One is enabled to perceive tumors or thickenings of the front wall of the stomach by their lack of translucency. Whether indistinct translumination will also prove of some diagnostic value the future will have to show.

Before ending my article, I will discuss a paper which recently appeared and touches upon our subject. I refer to the paper of T. Heryng and N. Reichmann, entitled *Ueber elektrische Magen- und Darmdurchleuchtung (Therap. Monatshefte, March, 1892, p. 128)*. Heryng and Reichmann in their thorough and able paper communicate the results of translumination of the stomach and large intestine. They

consider the method as one which "could in certain cases disclose the position and the limits of the stomach." Heryng and Reichmann have made use in their investigations of an apparatus in which the lamp is cooled by means of a cold-water stream circulating in the instrument. According to my opinion, this arrangement in the apparatus is not necessary—for on the one hand the translumination of the stomach is accomplished after the stomach has been provided with water; on the other hand, the whole examination for gastrodiaphany can be done so quickly that there is no danger of the lamp becoming too heated. I always find the lamp of the gastrodiaphane when taken out from the stomach only lukewarm, never hot, for the reason that the water contained in the stomach prevents the lamp from getting too warm.

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